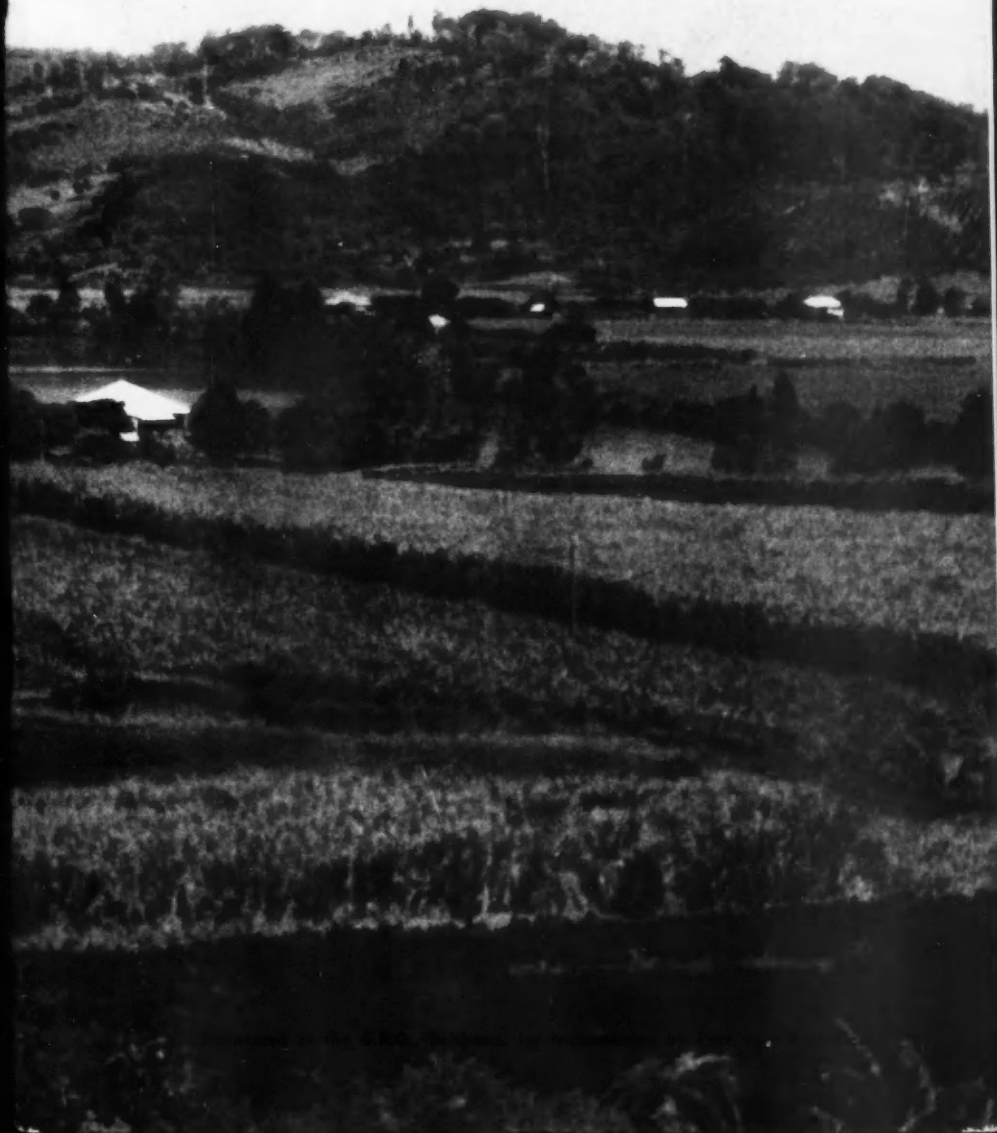
THE Cane Growers' QUARTERLY BULLETIN

VOL. XXII, No. 2 1 OCTOBER, 1958



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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

1 OCTOBER, 1958

Wholly set up and printed in Australia by
WATSON, FERGUSON AND COMPANY
Brisbane, Q.

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This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

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EDITORIAL

Giant Sensitive Plant Control

The appointment of a Bureau officer to the Noxious Plants Committee of the Co-ordinating Board, to represent sugar industry interests, is a progressive step towards ultimate control of giant sensitive plant. This appointment was the result of an approach by the Queensland Cane Growers' Council to the Hon. the Premier in an effort to ensure improved liaison between the weed control authority and the sugar areas involved.

Our short experience with this plant pest is sufficient to justify an exceptional effort towards eradication. It was identified originally in the Tully area in 1944 *and was, within a few years, found in several small patches in the Tully and Innisfail districts.*

As early as 1948 *the Bureau had the plant declared as a noxious weed under the Local Authorities Acts in all parts of the State, but little, if anything, was done to control or eradicate it. Within recent years the seed of giant sensitive plant has been found to be an adulterant in imported centrosema seed which is being used as a tropical pasture legume, and the pest has occurred in plantings of centro in Ingham, Proserpine and Mackay.*

State and Commonwealth legislation has now moved to prevent this mode of entry, but Queensland is left with the job of eradicating such plants as have resulted from the many past introductions.

Giant sensitive plant is an extremely serious pest. It has already caused substitution of assigned cane land and brought about financial losses to cane growers. If a concerted and continued effort is not made, the losses could become more serious and more widespread.

Cockatoo Damage

By A. A. MATTHEWS

Every year throughout the sugar industry a small percentage of growers are troubled by a number of miscellaneous pests. The damage they cause may amount to only a small loss to the industry as a whole but it can be quite serious to the individual grower concerned.

During 1958 white cockatoos caused extensive damage on several farms in the Proserpine area. The damaged stalks are different from those damaged by rats in that all the stalk from about two feet up is chewed.

Attempts to shoot the pests have proved unsuccessful as the birds soon return to the field after the departure of the farmer with his gun. Dead cockatoos have been hung in the fields, but only in odd cases has this stopped the birds from returning.

Fig. 19—Cockatoo damage to plant Q.50 on a farm at Conway, Proserpine. The extent of the damaged area is remarkable.

Photo: R. W. Mungomery

birds attack the outside rows of a field and continue inwards, eating six or eight rows at once. With their sharp beaks they soon peel off the hard rind and peck out the soft, sweet, internal fibres. Several consecutive internodes are eaten in this way to such a degree that the amount of rind left by the birds is so small as to be incapable of supporting the bulky top, and the top portion of the stalk soon topples over. What is not eaten by the birds soon dries out, hence most of the stalk is destroyed.

Several methods were tried to entice the birds to feed on corn set out in the canefields that were being attacked. As a result, it was found that the cockatoos would not touch grain on the ground or cobs which had been husked, but whole cobs tied to stalks of cane were eaten by the birds. Following on this, a four per cent. phosphorus preparation was placed under the husks and several birds were successfully poisoned. However, although the cockatoos did not return to this block, this was not the com-

plete answer to the problem because the bait had to be shifted to a new field when it later began to be attacked.

Of the present-day varieties being grown in the Proserpine area, it is known that Q.50, Q.56 and Q.58 are all subject to attack, but a survey is being carried out to ascertain whether any other variety is not so readily acceptable to these birds. If a variety showing a reasonable degree of resistance to the depredations of cockatoos is found, then it may be advantageous to plant the affected blocks wholly to this variety, or alternatively it may be practicable to ring fields with a few rows and end stools of this cane so as to confer protection on the remainder of the block which might be planted to one or other of the susceptible varieties favoured by the grower.

Fig. 20—Close up of the cockatoo damaged cane. Note the stripping of the rind and the weakening of the stalk to such extent that the top section breaks off. Photo: R. W. Mungomery

Carbide Gun to Control Bird Pests

As a result of the damage inflicted by white cockatoos on mature cane on a number of farms in the Proserpine area during June of this year, the Bureau purchased an "Exid" carbide gun for use as an experimental unit in an attempt to scare these birds from the fields of cane where they were concentrating their attack.

Similar units had proved successful in scaring parrots from orchards in the Stanthorpe district and cockatoos from maize in parts of the Atherton Tableland, so there appeared to be every reason for optimism that these carbide guns would prove equally efficacious when used in sugar-growing areas.

When the carbide gun was first taken to the Proserpine area some preliminary work was undertaken on some farms at Conway using different sized wicks which fed water to the charge of carbide. This was done in order to determine the optimum interval between the regular firings of the gun. Finally it was found that if the gun was calibrated to fire every ten minutes the cockatoos were effectively scared away. At the first firing of the gun they rose in a flock from the canefield and settled in trees around the periphery and with successive firings they retreated in increasing circles into the level forest country until they were forced back to the hills, where a few of them could be seen feeding on grass trees. At this interval of firing, it was estimated that the gun would continue firing for two days without the need for recharging with carbide.

Although the cockatoos were still present in the area when the last report on this project was received, they had ceased to visit the block of cane which they were previously damaging, so it would appear that the carbide gun, which incidentally costs about £30, has been completely successful in scaring them away. No doubt growers in other areas who have been similarly troubled in the past will take advantage of this ready means of protecting their crops in the future, particularly when it is known that single areas as large as an acre in extent have been destroyed by these pests.

R.W.M.

A Tale with a Moral

APPLYING BHC AT PLANTING TIME

By G. WILSON

Although the Bureau has advised growers that BHC should be applied at planting time in areas where frenchi grubs occur, and some Cane Pest and Disease Control Boards have backed up the efforts of their Supervisors with circular letters to emphasise that advice, the growers who have adopted the practice form only a small proportion of those who should do so. When the subject is discussed the impression is gathered that the main stumbling block is the fear, on the growers' part, that BHC placed so close to the plants will interfere with the strike. Some growers try to compromise by applying the BHC earlier than is usual for greyback grub control, *i.e.*, after the cane has germinated, but it is then impossible to put on enough covering soil to protect the BHC without smothering the young stools, and it is common to see BHC lying exposed on the soil.

In the fields that were treated with BHC at planting time, ample evidence has been provided to the growers concerned that their strikes were not harmed, even where quantities over 100 pounds of 20 per cent. BHC dust were applied per acre. A number of instances could be described in support of this statement, but the recent experience of one grower in the Mulgrave area is of particular interest, as we are able to illustrate his experience by means of the accompanying photographs.

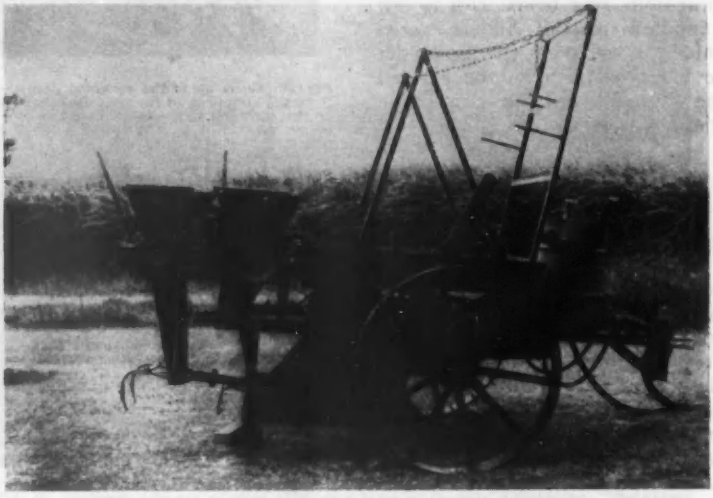

Fig. 21—This planter, used to plant the cane shown in Fig. 22, is equipped with mercurial spray, fertiliser hopper, covering tynes and BHC distributor.
Photo: G. Wilson

When that grower was ploughing in April young frenchi grubs, in the first and second stages, were plentiful in his field, and he was advised that if the BHC were not applied at planting time his young plant cane could be badly damaged. Although the grower expressed his fears concerning the

effect of the BHC on the plants, he had the good sense to accept the Bureau's advice, and built a very effective BHC distributor which was placed behind the fertilizer box on the cutter-planter. Many of the grubs survived the ploughing and discing of the land and were found in moderate numbers, in the second stage, when the cane was planted. Twenty per cent. BHC dust was used at 110 pounds per acre, and in the course of doing so the grower shut off the BHC distributor on short sections of two rows, about five chains apart. This was done in order to check the effect of BHC, firstly, on the growth of the germinating setts, and secondly, on the control of the frenchi grubs.

Fig. 22—May plant Q.50. Rows on right received 110 lb. per acre of 20 per cent. BHC dust. The row on the left did not receive any BHC.

Photo: G. Wilson

As soon as the cane appeared above ground the poorer growth in the two sections of row without BHC became obvious, and that cane has not since caught up with the treated cane although the grubs went down into the subsoil for their winter rest during July. It is anticipated that when the grubs return to the top soil in their third stage, about November, they will almost completely destroy these unprotected stools. However, the BHC on the adjoining rows will have some beneficial effect by reducing the overall number of grubs in the vicinity, and the stools may survive although damaged. The photograph, Fig. 22, emhasises both the poorer growth of the untreated sections of row, and the excellent strike and stooling in the rows where BHC was applied.

It is not usual for frenchi grubs to cause such obvious damage while still in their second stage. The effect is usually deferred until November or December when the grubs become active in their third stage; however, on a neighbouring farm, also, very young cane which showed some wilting of primary shoots was similarly found to be infested by second stage frenchi grubs in June. This was due to a seasonal effect on the life of the grubs. Owing to very dry weather in the spring in 1957 beetles did not start to emerge until Christmas Eve

with the result that second-stage grubs were still feeding in June. Normally they would have gone down to hibernate in May.

Plant cane is not frequently damaged by frenchi grubs because a large proportion of them is destroyed by ploughing and discing the fallow ground. But if a crop is harvested and the field immediately ploughed and replanted, or a field planted late where ploughing has been deferred until the grubs have gone down into the subsoil in the winter, then the damage can be severe, the more so because late-planted cane has not had sufficient time to develop a large rooting system before the grubs return in November. However, when frenchi grubs do damage a plant crop, and this can occur with early plant cane, the results are serious because not only is the plant crop reduced but also the stools ratoon poorly.

The arguments in favour of applying BHC at planting time for frenchi grub control are overwhelming. A strong undamaged stool in the plant crop is an essential prerequisite to good yields throughout the three years cropping. No extra cost is involved in comparison with applying a similar amount at a later date. It is not necessary to modify the cultivation for weed control, or re-open drills at a later date, to allow of a proper application of BHC where the drills have become prematurely filled in. Only one precaution should be taken. It is essential that the BHC be laid as a single band about five inches wide and half an inch above the setts, not below them, and it should not be mixed with the fertilizer. To accomplish this the boards of the planter should be so adjusted as to allow a small amount of soil to run in over the setts before the BHC dust is discharged on top of them. If any grower is in doubt regarding the correct method of application, he should seek advice from his Pest Board Supervisor or from an officer of the Bureau before setting up the BHC distributor.

Scale Insect in the Isis District

Growers in the Isis area have been alarmed over the heavy incidence of the sugar cane scale insect on standover crops of the variety C.P.29/116, and the low c.c.s. of these crops at the commencement of the 1958 crushing season.

While a drop in quality is usually associated with heavy infestations of the scale insect, this pest cannot be regarded as the sole factor contributing towards the low c.c.s. which characterized many of the early harvested blocks, and such factors as late growth, heavy suckering, and late and heavy fertilizing with nitrogenous fertilizers have all had their influence in further delaying the maturity of a normally late maturing variety. However, there is every reason for belief that had the harvesting of many of these crops been delayed for another two or three months there would have should be made to use white oil at a strength of 1 in 40 with the organic been an appreciable rise in quality despite the presence of the scale.

Some growers rely on standover C.P.29/116 to give average quality crops at the commencement of the crushing, but when prolonged dry conditions firstly favour the excessive development of scale and succeeding wet weather secondly encourages late growth, the results can be disastrous from a financial viewpoint. This variety seems to be the most susceptable to attack, so where it is part of the farm programme to grow some standover cane, growers should give consideration to growing a proportion of other varieties such as P.O.J.2878, Vesta, or eighteen month crops of N.Co.310. It is, of course, essential that clean planting material free from scale be used in the first instance, but if there is any doubt regarding its freedom from scale, arrangements mercurial solution in the cutter dip planter.

R.W.M.

Ditch Digging

By J. H. BUZACOTT

Most major farm operations have now become mechanised and included amongst them is that of ditch digging. There has been a move during recent years, in those areas where irrigation is practised, to dispense with permanent above-ground fluming and instal major reticulation lines underground. This does away with the weed problem associated with overhead fluming and avoids the constant maintenance or replacement of the galvanized troughs which were used in the past for this purpose. It is customary to instal the underground irrigation pipes at well below implement depth and this necessitates trenching down to three or four feet to accommodate the six inch or larger piping which is used.

In the Cane Growers' Quarterly Bulletin for April, 1957, a Back Hoe Digger was illustrated digging a ditch for drainage pipes on the Bundaberg Sugar Experiment Station. Recently at Innisfail another much smaller type of machine was seen in operation. In this instance the ditch was being dug across a cane farm for the laying of a water main. The ditch digger, which is shown in operation in the accompanying illustrations, is owned by the Johnstone Shire Council. It is operated by a crude oil engine which drives two endless bucket chains, one of which does the digging, raises the spoil and delivers it to the other chain, which in turn deposits it in a neat heap well to the side of the ditch. Forward traction is automatically performed by the engine winding in a cable which is attached to anchor posts driven in a chain or so ahead of the machine.

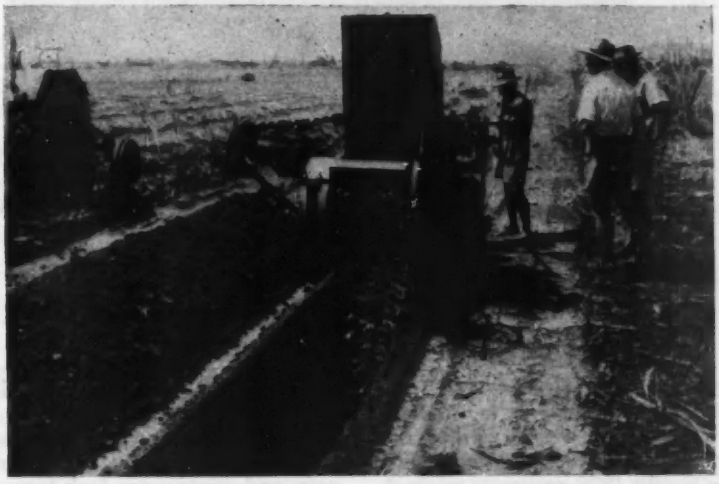

Fig. 23—The ditch digger in operation. Note the clean trench and the heap of spoil.
Photo: J. H. Buzacott

When seen operating this ditch digger was producing a trench one foot wide and three feet deep at the rate of one chain per hour. The operator has no driving to do. He merely starts the engine, moves the posts for the dragline forward when necessary, and occasionally adjusts the depth wheel.

Apart from the installation of irrigation lines and ditches the implement

would be eminently suited for digging the deep drains which are a major factor in successful canegrowing in many districts, particularly Mackay and the wetter areas of the far north.

Fig. 24—Ditch digging on the South Johnstone road—1957.
Photo: J. H. Buzacott

More New Varieties

During the past few years new varieties have been entering the industry at a rate never previously attained. Q.57 has become well known in the north; Q.58 promises to reach really major proportions; Q.59 has a place in parts of the wet belt; Q.61 is popular in the south; Q.63 and Q.65 are showing up as valuable canes in Mackay, as is also Q.68; Q.66 and Q.67, the two outstanding lodging resistant canes, are making a name on rich lands; and Q.70 is an addition to the South Queensland lists.

The lengthy cane breeding research is paying dividends at an accelerating rate, and growers can look forward to an improving era of crop and sugar production. Special purpose canes for rich and flooded land are now available, and varieties like Q.58 and Q.63 will doubtless raise the general c.c.s. average.

N.J.K.

Better Pre-Emergence Weedicides—At a Price

By A. G. BARRIE

Recently four weedicides were tested in a trial for their pre-emergence weed control properties. The weedicides used in the trial were 2,4-D, M.C.P.A., 2,4,5-T, and C.M.U.

The sodium salt of 2,4-D is the weedicide most commonly used on Queensland farms but has given very variable results. M.C.P.A. is very similar to 2,4-D. This weedicide has the ability to last for a longer period in the soil than 2,4-D. It was first produced in England about the same time as 2,4-D and, in that country, it is now used for about 90 per cent. of the area sprayed. In the United States, however, the 2,4-D has been the more popular of the two weedicides. 2,4,5-T is also similar chemically. It has been mainly recommended for spraying woody shrubs and trees, but is also very persistent in the soil. It has been reported as lasting longer than either the 2,4-D or M.C.P.A. The C.M.U., on the other hand, is completely different. This weedicide has been used extensively in the United States and Hawaii and it has been credited with being long lasting in the soil. It has displaced much of the 2,4-D for pre-emergence spraying.

The trial was conducted on a fine sandy loam soil which had a good tilth and high moisture content. The four weedicides were used in various amounts as shown in Table I, and were applied on 26th April, 1957. During the period from the 26th April to 6th July, when the weeds on the plots were cut and weighed, there were 39 days on which five points, or more, of rain were registered and a total of almost nine inches was recorded. Rain followed immediately after the spraying of the weedicides.

The weights of weeds on 6th July, which was approximately ten weeks after spraying, are shown in the following table:—

TABLE I

Weedicide	Rate of application	Weight of weeds gms. (av. of 3 plots)
2,4-D	4 lb./acre	862
M.C.P.A.	4 lb./acre	508
	3 lb./acre	755
	2 lb./acre	1004
2,4,5-T	4 lb./acre	1020
	2 lb./acre	985
C.M.U.	2 lb./acre	615
	4 lb./acre	312
Unsprayed	—	1769

Notes were taken at intervals and each plot was given a score 0-6 according to the quantity of weeds present. Plots with as much weed growth as the unsprayed were given a score of six while those without any weeds received a score of nought, and a score of three would indicate half as much weed growth as the unsprayed. The following table shows the grade that each treatment received each week from 16th May to 13th June.

The results in the two tables show that the C.M.U. formulation was greatly superior, at the four lb./acre rate, to the other weedicides. M.C.P.A. at the four lb./acre performed well and both this and the C.M.U. at two lb./acre gave better control than 2,4-D. The reason for the superiority was probably due to the longer lasting properties of these two weedicides. The 2,4,5-T was of little use as a pre-emergence weedicide. Although the weedicide persists in the soil it appears that it is not sufficiently active to kill the germinating weed seeds.

During the first week after spraying a large number of weeds were noted in the C.M.U. plots, and it appeared that the treatment was going to be ineffective. However, these seedlings did not develop and by the 16th May when the first notes were taken there were very few remaining. The C.M.U. has to be

TABLE II

Treatment		Score for amount of weeds (av. of 3 plots)				
		16th May	23rd May	30th May	6th June	13th June
2,4-D	4 lb./acre	2.0	2.0	3.0	3.5	3.0
M.C.P.A.	4 lb./acre	1.3	1.3	2.0	1.7	1.7
	3 lb./acre	1.3	2.3	3.0	3.3	3.0
	2 lb./acre	2.3	2.3	4.0	3.8	4.1
2,4,5-T	4 lb./acre	2.7	2.8	3.3	4.0	4.3
	2 lb./acre	4.0	4.3	5.0	5.3	5.3
C.M.U.	4 lb./acre	1.0	0.3	0.6	0.6	1.0
	2 lb./acre	1.0	0.7	1.0	1.3	1.2

absorbed by the roots before it can kill the plant, and so is slow acting. The manufacturers advise that best results are obtained if it is watered in, so conditions would have been favourable for it as rain fell soon after spraying.

Just as there are considerable differences in the amount of control by the weedicides, so too, are there differences in price. The 2,4,5-T has no value as a pre-emergence weedicide so its price has not been included. The following table shows the cost of spraying one acre at the rate of four pounds of active ingredient. These are based on Cairns prices for small quantities:—

TABLE III

Weedicide	Cost—4 lb.
2,4-D	£2 8 6
M.C.P.A.	£4 9 6
C.M.U.	£17 14 1

The price of C.M.U. at present excludes it completely from practical use, even if it were applied at two lb. per acre. However it is used economically in the United States and Hawaii and competes very well with 2,4-D. Its supply appears to be very limited at present and its price may be reduced in the future. M.C.P.A. is manufactured in Australia but it is still considerably higher in price than 2,4-D, and it is doubtful whether this increased cost would be offset by the better weed control obtained.

Lodging Resistance

An attempt to measure lodging resistance of cane varieties is being made at Meringa. To date there appears to be some correlation between the test being applied and the field behaviour of the canes. Varieties which lodge easily are costly to harvest and there is an unfilled need in North Queensland for varieties which will remain erect even in a heavy crop. It will be an important advance if, in the early stages of a cane's development, we can define and select those with high lodging resistance.

Unusual Damage to Mature Cane

By E. H. Fox

Most growers noticing cane stalks bitten into or similarly damaged would consider such depredations as being due to the ordinary field rat and, perhaps for the most part, they would be correct. However, there are odd times when some other native animals or birds depart from their normal mode of life and turn their attention to cane, and the very nature of the damage which they inflict sets it apart as being quite distinct from that of the field rat.

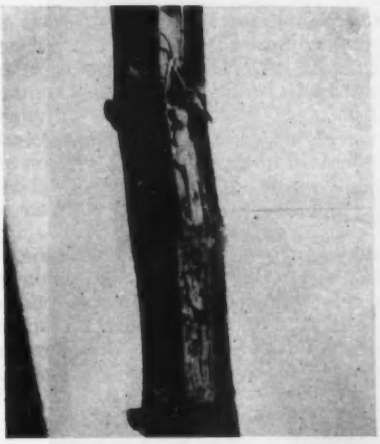

Fig. 25—The type of damage inflicted by the cassowary on standing cane.
Photo: W. M. Mullins

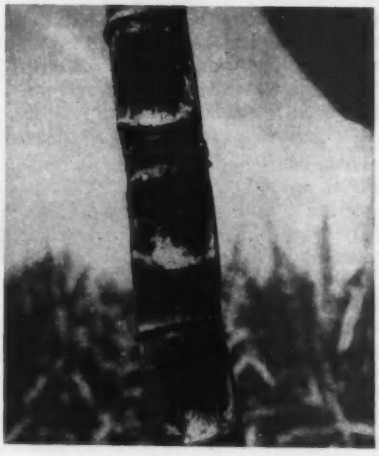

Fig. 26—The manner in which the naked tailed rat damaged the internodes of the recumbent stalks.
Photo: W. M. Mullins

Cases in point were recently brought under the writer's notice at Tully when, from certain circumstantial evidence, it was concluded that on rare occasions cassowaries may be involved in this type of damage, while the large scrub rat with a naked white tail sometimes also attacks mature cane.

Grounds for associating the cassowary with the destruction of sugar cane stalks were strengthened when their tell-tale tracks and other distinguishing characteristics were seen near the damaged areas, while the nature of the injury inflicted was noticeably different from that usually seen. In this case the upright stalks were pecked into and there was a characteristic stripping of the rind at four to five feet from the ground—just the height at which damage by this type of bird would be expected to occur. In addition, the groove that had been pecked out was continuous, the hard nodes having been eaten through in exactly the same manner as the softer internodes. This is in marked contrast to rat damage and Fig. 25 illustrates the point.

This type of damage is extremely rare and it is mainly of scientific interest. It is seen only on the margins of fields that border patches of rain forest, since for the most part cassowaries feed on berries and similar native fruits occurring in this environment. The losses incurred are negligible and they certainly do not

warrant the destruction of these birds. In any case, cassowaries are protected under "The Fauna Conservation Act of 1952," and a heavy penalty is provided for persons convicted of destroying these unique, colourful and inoffensive birds.

The variety Q.64, which was growing near scrub in the El Arish area, figured in the second type of damage that was noticed. In this instance the attacked cane stalks were in a horizontal position and only the softer internodal tissues were gnawed out. However, the edges of the damaged portion showed teeth marks much further from the perimeter than is normally the case when the ground rat is involved. Furthermore, the debris that was left behind, consisting of cubes and slivers of fibre sucked dry, was unfamiliar.

Attempts to stop the damage by placing poisoned wheat near the scene of activities were unsuccessful, but finally specimens of a large naked-tailed rat with a white tail* (not the white-tailed water rat) were caught in traps that had been baited with bananas. Traps set in other parts of the field yielded a total of nine specimens.

These rats are essentially scrub dwellers and are found from Ingham northwards. In June, 1936, a number were recorded from cane fields at Abergowrie and Gordonvale, but apart from localized damage they are not considered to be of any great economic importance. Their semi-prehensile feet and gripping tail enable them to climb trees readily, and a closely related species on Hinchinbrook Island is known to damage coconuts there.

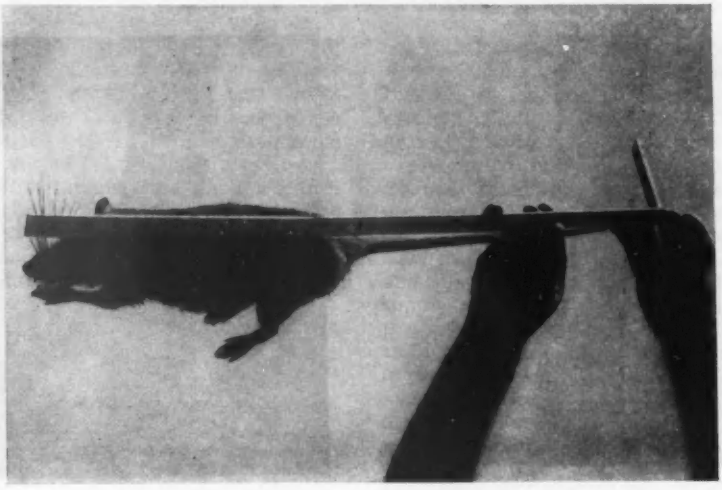

Fig. 27—Illustrating the size of the naked tailed rat.
Photo W. M. Mullins

* Scientifically known as *Uromys caudimaculatus* Krefft.

Field Day Address—Mackay, 1958

By L. G. VALLANCE

When checking through district figures recently a rather interesting fact was revealed. It was found that, over the last 10 years, crops on Mackay Experiment Station averaged about 3¼ tons of cane per acre better than the average for the rest of the mill area. This was somewhat surprising since not only do we have a large proportion of second class and third class cane land on the Station, but the requirements of much of our experimental work prevent us from harvesting maximum crops in many cases. For example, there are many new seedlings and introduced varieties undergoing tests and which do not produce a yield equal to that of the locally used canes. Furthermore, it is necessary in the various fertilizer trials to include plots which have received no fertilizer, for the purpose of checking responses to the fertilizer applications under test. All these things naturally reduce our yield per acre and, as previously remarked, it is surprising to find our figures still above average for the area.

I know that many of our neighbours grow much heavier crops than we do and the causes outlined above are a big factor in this regard. It therefore stands to reason that there are quite a few growers in the district who should be able to produce better crops than they are doing. Possibly they are not making the best use of the excellent range of varieties that is now available to Mackay. In this respect the slow rate of increase in the acreage of Q.58 is rather surprising. This is a good cane and, under a rather wide range of conditions, will give you better results than Q.50. It constituted about 20 per cent. of the district tonnage at Plane Creek last year, and it is hoped that other Mackay mill areas will take similar advantage of its good qualities in the near future. I might also mention the two recent additions to the approved list—Q.63 and Q.65. The former is an early sugar variety and our figures to date indicate that at the beginning of the crushing its sugar content is higher than that of any of the other approved varieties. Q.65 is a late maturing cane and, to my mind, it has a very useful future in this district where the crushing season is often long and extended. You see, therefore, that there are several possibilities in maintaining maximum yields by a judicious selection and use of varieties. In this connection, I cannot do better than suggest that anyone who is interested in doing so, might discuss the varietal possibilities on his farm with Mr. Story or various members of his staff, as opportunity permits.

Another point of some importance in maintaining efficient production is the fact that, on the Experiment Station, fertilizer is used according to the requirements of the soil on a particular block.

We have found that, over the years, the emphasis in our fertilizer programme has changed from phosphate to potash, and potash rich mixtures are replacing the high phosphate fertilizers previously used. As a matter of fact, on some blocks we have found it beneficial to make some applications of straight potash. We known also that a similar change in fertilizer requirement is taking place in many other parts of the district. It seems to me only a matter of common sense that a grower should be vitally interested in the fertilizer requirement on his own property. Our Soil Chemist, Mr. Bieske, can help you in this respect.

On the subject of fertilizers you might recall that last year I spoke to you of urea. In the past 12 months this fertilizer has proved itself to be a very good and economical way of supplying nitrogen to cane. Representations have been made to the Commonwealth authorities requesting its availability in greater quantities. On this Station, as well as on our other Experiment Stations, we are using it in place of sulphate of ammonia. Recently, the

aerial application of urea has been carried out in several districts and has received some publicity. At this stage, I would like to be a little cautious as to the ultimate success of this aerial method, since we do not yet know whether the broadcast blanket application will be as efficient as the normal placement, which is in a more or less concentrated band along the cane row. I know that it is used extensively in such a way in Hawaii; but there, the aerial technique is applied to a crop in its second year, because it is the most convenient and practically the only way to make the application.

To return to the subject of optimum production, there is no need to remind you that soil physical condition and its effect on tilth is a most important factor. In Mackay, particularly, the aeration and drainage of the surface soil has a great influence on the well-being of the crop—from planting to harvest. On this Station we have a trial in progress to test the value of combined deep ripping and bagasse application. Already some preliminary beneficial results have been obtained, but whether they will be permanent remains to be seen. Incidentally, some growers in the Pleystowe area have been getting very good results from the application of bagasse, particularly on the heavier and wetter portions of a cane field. There are one or two points to be taken into account when considering bagasse dressing, such as possible nitrogen starvation and a suitable method of incorporating the material into the soil. Our Mackay officers can give you these details should you require them.

Urea

A leading article in the American publication "Chemical and Engineering News" contains the following interesting details regarding the world's urea industries:—

(1) Several major producers in the United States are planning big expansion of their factories.

(2) Urea's high nitrogen content means lower freight and storage costs and lower application charges.

(3) In 1959 the urea manufacturing potential of the United States will be 750,000 tons a year.

(4) Despite an existing production potential of 550,000 tons the United States imported 60,000 tons last year.

(5) West Europe's urea manufacturing capacity is 450,000 tons.

(6) Japan has 12 urea plants and has a production capacity of 418,000 tons a year. Four other plants are planned.

(7) The United States considers the urea future is bright and that the real urea boom will be from 1960 to 1962.

(8) India is planning its own urea factories.

(9) Stock feeds in the United States use nearly 80,000 tons of urea each year. One of these mixed stock feeds contains urea, ethanol, phosphoric acid, trace minerals and molasses. The ethanol promotes utilization of the urea by the animals.—N.J.K.

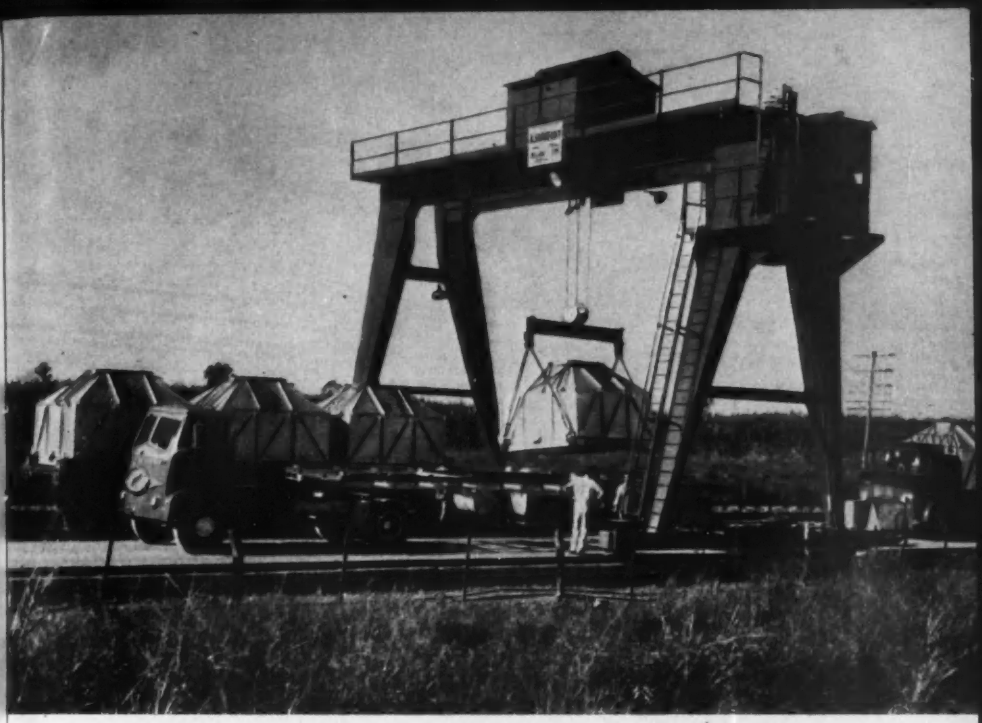

Fig. 28—The transfer depot for Tully bulk sugar going to Lucinda. At Lilyponds the railed bins are transferred to motor transport.

Photo: I. J. V. Stewart

Fig. 29—A good crop of the lodging resistant variety, Q.67, at Meringa Station.

Photo: J. H. Buzacott

Fig. 30—Scene on the farm of F. Johnson, Loloma, near Koumala, in the Mackay district.
Photo: J. H. Buzacott

Fig. 31—Showing the set-up on a grubber for soil fumigation against nematodes. The plastic tubes, ending in jets, run down the back of the tynes.
Photo: J. Wesdorp

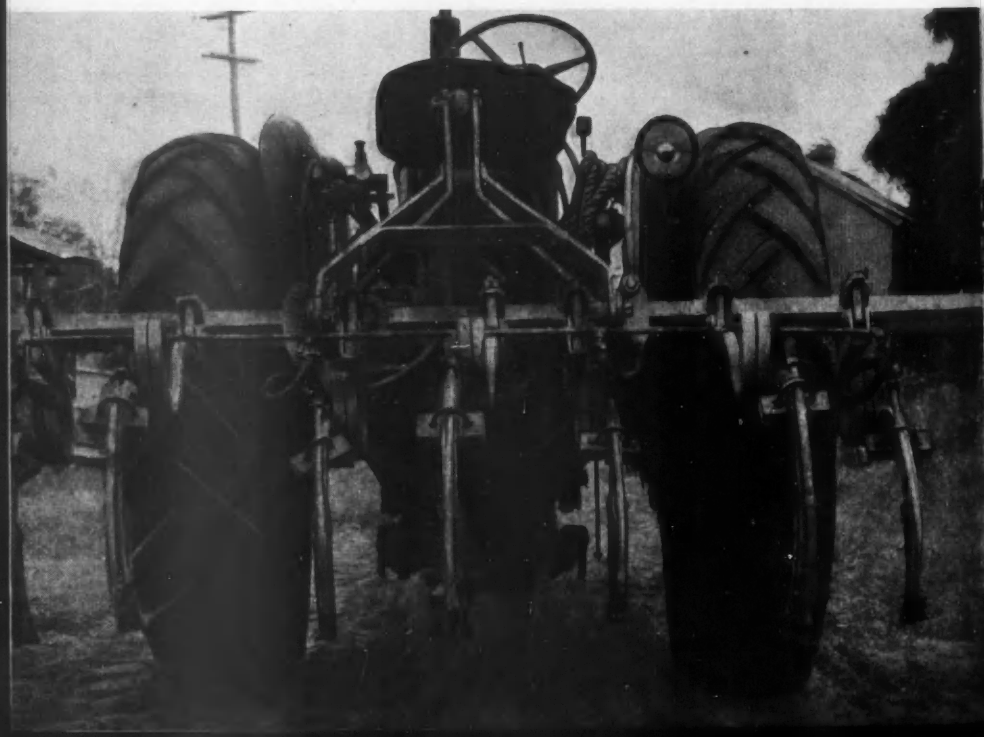

Fig. 32—Planting operations on a Gordonvale farm.
Photo: J. H. Buzacott

Fig. 33—Cane lands at Smithfield and Stratford in the Cairns district.
Photo: J. H. Buzacott

Fig. 34—Q.59 plant cane at Meringa, 1958.
Photo: J. H. Buzacott

Fig. 35—Looking over the North Johnstone River on to alluvial flats of the Goondi areas.
Photo: D. R. L. Steindl

Aerial Application of Urea

By J. WESDORP

Aerial application of urea is new in the Burdekin, but some farmers with late cut or somewhat backward ratoons were interested and progressive enough to give aerial application a fair chance on their properties. The result was that the uniformity of aerial application was found to be successful and some hundreds of acres were fertilized in this way, until eventually a shortage of urea developed and the programme had to be interrupted somewhat prematurely. All these applications were made in February, 1958.

Fig. 36—The venturi spreader mechanism, for distributing urea, fitted beneath the wing of the plane.

Photo: J. Wesdorp

The aerial application of fertilizer could appeal to farmers because the cost of an application by hand would be almost as high as the prices charged for the aerial application. An obvious advantage is the evenness with which the application is made; in fact, this evenness could never be achieved by hand applications.

It is unlikely that the aeroplane could compete with the tractor for the purpose of applying fertilizers, but there are cases where, due to circumstances, a farmer has not been able to apply fertilizer before cane got out of hand. There are also cases where cane seems backward and, provided that the block is intended to be cut late, an extra dose of nitrogen might be helpful in getting better growth and ultimately a better return. The long-standing Bureau recommendation to apply nitrogenous fertilizers in one dressing before the wet season sets in still applies, and growers are strongly advised to follow this recommendation. On the other hand, it is obvious that there are circumstances where a late, second application might be desirable; aerial application of urea has certain advantages, in such cases, over hand application.

There was some doubt in the minds of growers, before the campaign, as to whether the urea would burn the leaves of the cane, particularly in the presence of water in the spindle. However, inspections made some time after the aerial applications had taken place showed that none of the cane which had received urea at rates from 80-160 lb. per acre showed symptoms of burning. Rainfalls after applications varied from light drizzles to heavy flood falls. No doubt the care of the pilot contributed to this result because urea was spread only when foliage on the cane was dry. The result was that the bulk of the material fell straight on to the ground. Only a small proportion lodged in the spindle and behind the leaf sheaths.

The aeroplane used was the jack-of-all-trades Tiger Moth and, for the purpose of spreading solid substances a spreader was attached underneath the fuselage. This consists of a hopper with dual agitators, but these were found to be unnecessary for the spreading of urea, owing to its excellent flowing properties. From the hopper the urea passed through a throat with a simple gate. A pin and hole arrangement on this gate governed the rate of output of the urea. From the throat the urea passed through a venturi on to a spreader. The urea was thus actually sucked out of the throat and no intricate mechanical devices were necessary to give a measured amount of material. The spreader plus the aerodynamic forces of a flying aeroplane helped in the even spreading of the urea.

When an aeroplane is applying fertilizer it will be noticed that it flies at a greater height than is usual with spray applications. With urea the plane flew at a height of 40-50 feet above the ground; when fluids are sprayed the pilot flies very low over the vegatation, because the extra turbulence created by low flying is helpful in covering the under as well as the upper surfaces of the leaves with droplets. However, when a solid like urea is distributed, a certain height is desirable to get a wider and better spread of the falling material. Another difference between spraying and spreading is that urea may be spread all day provided the wind is not too strong, whilst spraying is usually done in the early morning hours and has to be stopped as soon as wind causes too much drift

Flying at this height of 40-50 feet, a width of 16 yards was covered by the plane but, since the distribution thinned out towards the sides of the strips, overlapping applications were made. The amount of overlap was three feet on either side of the run. The runs were therefore spaced at 14-yard intervals, which is equal to nine rows, if the runs are made parallel to the rows of cane. It is more convenient to apply urea parallel to the rows since it is easy to line up and follow the rows. The help of one man on the ground who flags the pilot in on the right row is all that is required.

Runs were generally made parallel to the greatest length of the block and, in the majority of cases, this coincided with the direction of the rows. Where the greatest length of a block of cane ran across the rows the fertilizer was spread across the rows and two men were necessary to flag the pilot in. That the longest run over a block is the only economical way of spreading will be clear when it is realised that the plane travels at a ground speed of about 70 miles per hour or, say, a mile a minute. For a 20 chain run over a block of that length, about 15 seconds are required for covering 20 chains x 42 feet, or one and a quarter acres of land. However, for turning and coming back to the next strip it takes about a minute, or four times as long.

In a recent application on a farm, eight miles from the aerodrome, the following time-analysis was made where urea was applied in 20 chain runs:—

1 minute—spreading urea.

4 minutes—turning and coming back.

16 minutes—travel from drome to farm and back.

4 minutes—loading urea.

It is obvious that the travelling time is out of proportion with the time it takes to apply the material. This distance is the greatest single factor governing the cost of application. However, it should often be possible to lower this cost factor by shortening the time spent in travelling. This can be done by providing airstrips close to the job. The main task in airstrip making would be one of levelling and compacting a block of land, and this should lie well within the capacity of a group of farmers if the airstrip has to serve a number of neighbouring farms.*

Costs of applying urea vary with the amount it is desired to apply. An 80 lb. per acre application costs 16 shillings, and every extra 20 lb. it is desired to apply costs three shillings more. Thus a 120 lb. application costs 22 shillings, 160 lb. application costs 28 shillings.

There is, until now, no built-in premium in these prices for a short distance between the airstrip and the field where the application is to be made, but it is expected that this will take place as soon as, and if, the services of the aeroplane in the spreading of urea are of sufficient importance to warrant it.

*Civil Aviation requirements for an airstrip are, in short:—Strip should be 500 yards long; at either end of the strip vegetation or structures should not exceed a grade of 1 : 25. Width of strip is 80 feet and the strip should be so smooth that a car can travel over it without undue discomfort to the driver. On either side of the strip 60 feet must be cleared where an aircraft may be able to land.

Forecast of Approved Varieties for 1959

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1959. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1958. Any objections against varietal deletions, or suggestions for additions, must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in resect of late or unsubstantiated requests.

Mossman—Add Co.475 and Vidar.
Mulgrave—Add Co.475. Delete H.Q.426.
Babinda—Add Co.475.
South Johnstone—Delete Q.50.
Tully—Delete Eros.
Victoria—Add Q.58.
Macknade—Add Q.58.
Invicta—Add Q.67. Delete E.K.28.
Pioneer—Add Q.67. Delete E.K.28 and B.208.
Kalamia—Add Q.67. Delete E.K.28 and B.208.
Inkerman—Add Q.67. Delete E.K.28 and B.208.
Proserpine—Add Q.57 and Q.68.
Cattle Creek—Add Q.57 and Q.68. Delete Q.45.
Pleystowe—Add Q.57 and Q.68. Delete Comus, E.K.28 and Q.45.
Marian—Add Q.57 and Q.68.
Racecourse—Add Q.57 and Q.68. Delete Badila, Comus and Q.45.
North Eton—Add Q.57 and Q.68. Delete Comus and Q.45.
Farleigh—Add Q.57 and Q.68.
Plane Creek—Add Q.57 and Q.68. Delete Comus, E.K. 28 and Q.45.
Bingera—Add Q.58.
Fairymead—Add Q.58. Delete Q.59.
Gin Gin—Add Q.58. Delete Co.301.
Millaquin—Add Q.58. Delete Q.49.
Qunaba—Add Q.58.
Isis—Add Q.58. Delete Q.49.
Maryborough—Add Q.58.
Moreton—Add Q.58 and Q.70.

Beetle Damage in the South

By C. L. TOOHEY

One of the most notable features of the 1957 planting season in the southern districts of Queensland was the considerable amount of damage suffered by plant germinations as a result of localized depredations of insect pest. This was more particularly the case in the Rock Point-Beenleigh area. Just why this was so will be evident when it is realised that some of the immature stages of the pests in question are normally humus feeders, and as a rule confine their activities to grasslands and pastures. The year 1957 saw quite a large area of such lands brought under cane for the first time. In these lands, brought into cultivation often after years of stock grazing, insect populations were naturally very high. This fact, allied with the extremely dry conditions which prevailed during the latter half of the year, pre-disposed germinating setts to attack. Deprived of their natural sustenance these insects immediately sought the closest acceptable alternative, the young and succulent cane shoots.

Damage was most frequently occasioned by one of two species of shoot-eating beetles, with a third and smaller beetle sometimes taking advantage of the feeding punctures made by the former two insects. A brief description of these pests, and an outline of the injury caused by them may be of interest.

Fig. 37—Bad strike caused by insects on land previously used for pastures.
Photo: C. L. Toohey

Metanastes vulgivagus

This beetle varies in length from approximately ½ inch to ⅝ inch and is of a shiny black colour, the wing cases being marked lengthwise by a number of fine parallel lines. The underneath surface is of a reddish-black colour. In attacking the young cane shoot, the beetles gnaw deep, ragged holes through into the soft, moist tissues resulting in the death of the spindle. This gives rise to the typical "dead heart" appearance of affected fields. The pest was particu-

larly active in the Maryborough district, and to a lesser degree in the Moreton area during the spring.

Heteronychus sanctate-helenae

This is another black beetle, very similar in appearance to the former, but of only about four-fifths the length. While it has been prevalent for some years in northern New South Wales, it is apparently, as yet, restricted in Queensland to the south-eastern corner. Damage to the cane shoot closely follows the pattern of *Metanastes*. Considerable damage by this species was caused to cane germinating in the Rocky Point-Beenleigh area, where specimens were obtained and later identified.

Ataenius duplopunctatus.

Of a much smaller size—approximately ¼ inch—this beetle is of a dull, all black appearance, with a long, narrow body. No definite evidence of primary damage due to these beetles has ever been noted. They are most frequently found eating their way up through the spindle, apparently having entered by way of the wounds made by either of the two previously mentioned beetles. Another insect, the mole cricket, *Gryllotalpa* sp., with similar feeding habits on the cane shoots also provides a ready entrance point for the smaller beetle. In one damaged field of young Q.50 plant cane at Maryborough up to six of these minor pests were located in a single damaged spindle. Inspection of the base of the attacked shoots revealed that the initial damage had most probably been caused by the mole cricket or the black beetle.

The above beetles, and more particularly the two first described in this article, generally attack the wet shoot some little distance above the parent sett. In the case of a strong, healthy plant, attacked under favourable weather conditions, the small nodes formed below the point of damage will produce new shoots and cane will then stool normally unless insect populations are great. However, as recorded earlier, conditions were anything but favourable, resulting in poor stands of cane in some instances.

In the past these pests have rarely caused sufficient damage in Qussnsland to warrant the application of insecticides against them. Cane growers of northern New South Wales have successfully countered the attacks of *Heteronychus sanctae-helenae* by applying 15 lb. of 10 per cent. BHC dust per acre in the drill near the sett at planting time, followed by a further 15 lb. of the same strength per acre scratched into the bottom of the drill just as the shoots are coming through the soil.

Whether this treatment would be equally effective against the larger *Metanastes* is not known. It may, however, be a precaution well worthy of trial when bringing in new land, more particularly so land which has been under pasture for some years, and which is usually inhabited by a variety of insects harmful to sugar cane.

Aside from chemical control there is another, and perhaps better, means of defence against these pests, which will be evident from the following explanation. The beetles as a rule hibernate during the winter and resume their activities in the late spring, a period in which much of the damage to newly planted fields takes place. The full cycle from egg to adult for *Metanastes* sp. takes about three months, and although egg-laying is spread over a fairly extensive period, with consequent overlap in the various stages of the insect, it is unlikely that more than one generation a year is produced. A long-range fallowing of the fields either kept free of weeds and grasses, or with a leguminous crop, will therefore do much to lessen the chances of attack. When bringing in land in which beetle infestation might reasonably be expected to be heavy it would be best, where possible, to delay planting until the autumn, a season when damage, if any does occur, is likely to be on a greatly reduced scale.

Spreading Mill Mud

By S. O. SKINNER

The use of some mechanical method for the spreading of mill mud in the cane field after it has been dumped in heaps from a motor lorry is by no means new.

The accompanying photograph, however, is of considerable interest as depicting a very simple blade, ideal for the purpose, which in this instance is suited for ready fitting to the tool bars of a Farmall tractor.

The blade consists solely of two shanks of 1¼ inch high grade round steel welded to a plate of ¼ inch steel. Thus, as can readily be viewed in the photograph, the attachment is easily fitted, while raising and lowering is controlled by the normal lifting device of the tractor. Cost of manufacture for material and welding is in the vicinity of £12.

Messrs. Pensini and Locastro of Mourilyan, who built the blade, have spread mud with ease, rapidity and evenness. Rate of spreading is purely dependent on such factors as the operator and speed of movement. The growers have found the blade of equal value for quickly levelling a track where necessary for the laying of portable line, and attending to the many small tasks of grading and pushing which arise on a farm.

Fig. 38—The device used for spreading mill mud on the field.

Photo: S. O. Skinner

It is appreciated that many growers prefer spreading the mud by hand in order to secure maximum evenness. However, this is costly. It may be stated that mud is not a highly concentrated "plant food" and therefore does not call for absolute evenness of application. With subsequent tilling of the soil, the above blade gave a most satisfactory distribution.

Progress and Prospects*

By NORMAN J. KING, Director of Sugar Experiment Stations.

A quarter of a century is not a long period in the history of the human race, but it can be an important one, particularly if one refers to the quarter century just past. Agriculture, during that time, was faced with the pessimistic prophecies of statisticians who were predicting that food production could not maintain pace with the rapidly growing population. Today there are probably just as many undernourished people in the world as there were then—maybe more—but that is, to a degree, due to their inability to buy. From the agriculturist's point of view the production of food, both in the aggregate and in the amount per acre, has shown a marked increase over that period.

My talk to you today relates to the contribution sugar has made in this overall drive for greater food supplies, because sugar, although rated not too highly by some food faddists, makes life a lot more interesting and enjoyable, and is an important constituent of our diet. Our food would be much more drab and lacking in flavour if we had no sugar for cakes and pastry, confectionery and cordials, canned fruits and ice-cream, biscuits and fermented liquors, and for our tea and coffee.

Our sugar industry in Queensland might be taken as an example of the progress that has been achieved during the last twenty-five years. It is not an outstanding case in the field of world agriculture because it does not illustrate the maximum increase which could have been obtained with unlimited markets.

Sugar production has, during that period, been restricted by legislation, and it has been allowed to grow only to the extent that Australian sugar requirements and a planned export quota were met in an average year. The land to produce greater tonnages was, and is, available; there is no dearth of farmers to produce more cane; and history has demonstrated that factory capacity will be extended to produce the sugar.

But despite these limitations Queensland's output of sugar has increased over the quarter century between the early 'thirties and today to 230 per cent. of the 1931 figure; in the same period Australia's population has grown to only 147 per cent. To put it another way, in 1931 our sugar production was equal to 197 lb. for each member of the population and today it is 309 lb. This is a measure of production increase which far exceeds population growth. It has been made possible by the negotiation of export agreements within the British Commonwealth, and by taking advantage of certain markets which were undersupplied as the result of subnormal crops in other countries.

As is the case with many other commodities produced by our primary industries and exported to overseas markets, our export sugar generally brings a lower price than that used locally. The sugar industry has carried that lower price without subsidy and has, by averaging the local and export price, maintained a profit margin which allows it to exist as a stable agricultural industry. It is, in fact, the largest agricultural industry in Queensland and has, during the last financial year, exceeded the earnings of the wool industry—previously its only superior in earning capacity in this State. Consequently sugar is a sizable and important factor in Australia's overseas credits and, as

* A talk broadcast by the A.B.C.

such, is no mean contributor to Australia's financial economy.

Today Queensland sugar is a sixty-five million pound industry, and by that I mean that the value of its annual output of sugar reaches that figure. Twenty-five years ago its value was only eleven and a half millions. This increase to more than five times the 1931 income is due in part to the greatly improved production, to the better prices obtained on the export market, and to a lesser extent to the increase in the Australian price. But in regard to the local price of sugar we must not overlook the fact that, whereas in 1931, the consumer's price here was fourpence a pound, it has risen to only tenpence a pound today—an increase of 150 per cent. In the same period the basic wage has gone up 235 per cent.

So sugar has not been an important factor in the spiral of rising costs. Efficiency in production of this commodity has improved so greatly that despite a more than threefold increase in wage rates there has been only a two and a half times increase in retail sugar prices.

It would take a long time to recount in detail the ways in which efficiency has improved. Suffice to say that, on the farm, every operation from land clearing to the mature crop is mechanized; that mechanization of the harvesting is being vigorously attacked, and that of loading is widely used; that the milling of the cane and the manufacturing of the sugar is of a high standard and under precise chemical control; and that the bulk handling of the sugar into ships is a modern and progressive achievement which will return handsome dividends.

Despite the nearly two and a half times increase in production in the past quarter century the number of sugar mills crushing the crop and manufacturing the sugar has actually decreased. This is in line with the same policy of improving efficiency to counteract rising costs. Smaller factories have been closed and their areas absorbed into neighbouring mills of larger capacity. It is possible that the future may witness a further reduction in factory numbers since, as in other industries, the larger unit is the more economic one, and the retention of smaller units may not be in the best overall interests of the industry.

What are the future prospects for sugar? It is always easier to analyse the past and to comment upon its achievements and errors than to foresee what the next twenty-five years might have in store. Let us assume for the moment that land availability would not be a limiting factor, and that we are merely speculating on available markets for the sugar. Australia's population increased by approximately three million in the past quarter century, but population increase has a habit of accelerating and, allowing for the continuation of a vigorous migration programme, we might expect a greater increase in the forthcoming period. It is much more difficult to theorise about an export market. On the one hand there is a rapidly growing world population with the need, if not the purchasing power, for more sugar. On the other is the fact that more and more countries are aiming at self-sufficiency in sugar production, and many of the existing large exporters have the capacity for considerable expansion.

By and large, Queensland might expect to obtain some increased share of the growing world market and that, progressively, during the next couple of decades, it would have to enlarge its production capacity.

And now we must go back to the land to see whether we would be able to stage an expansion programme which could provide for a sizable increase in sugar output. Our sugar industry is not quite one hundred years old, and it developed along the coastline in the districts where adequate rainfall and suitable soils gave

the best promise of success. Baldly speaking, the pioneers picked the eyes out of the land and ignored the poorer soils and the drier belts. So, in recent times, there has developed a belief that we are running short of good sugar land. But the position has not yet reached that stage. There is a lot of good arable land which has not yet been cleared or cultivated and there is room for considerable development adjacent to some of the existing sugar districts. Admittedly there are other sugar areas which appear to have utilised almost every acre within economic reach, and these districts will not be able to plan expansion on the basis of increased area.

But even where the frontiers cannot be pushed back a production rise is possible and probable with the help of agricultural science. Although our farming is reasonably efficient it has not, by any means, reached the state of full exploitation of the soil's potential. Fertilizer usage, drainage, weed control and irrigation can be improved in many districts, and there is ample scope for stepping up production per acre even with the knowledge available at the present time. But the more promising field for improvement in the future lies in the development of high yielding cane varieties. Much has been done in the past but the complex genetical make-up of sugar cane suggests that future advances might be just as spectacular. Many phases of agricultural science are virtually unknown territory today and, with a better understanding of many of the factors involved, there will be a gradual upward trend in the productivity of our land.

It would appear that, for the foreseeable future at least, our sugar industry will continue to grow both in size and efficiency. Sugar is not a static industry in Queensland; the future is bright and it will be a long time yet before we can even think that our resources are approaching full exploitation.

Keep Up the Hot Water Treatment

After the initial hot-water treatments against ratoon stunting disease were carried out in Queensland and the subsequent improvement in cane growth became apparent, some mill areas have tended to adopt an "all's well with us" attitude and have carried out very little or no further follow-up treatments. This is undoubtedly a grave mistake because some of the original hot-water treated cane has already become contaminated and unless serious thought is given to this matter and concerted action is taken to consolidate the attack against ratoon stunting disease, we might soon revert to the position we found ourselves in some six or seven years ago.

Our friends in Mauritius are fully alive to the serious effects of ratoon stunting and chlorotic streak diseases and their Sugar Producers' Association has decided to embark on an ambitious programme of hot water treating 6,500 tons of cane annually, and establishing a central station for this purpose. In view of the prevalence of chlorotic streak here and the threat of re-contamination from ratoon stunting disease, Queensland growers might well look to their laurels!

R.W.M.

Guinea Grass and Para Grass Control

By L. G. VALLANCE

Guinea grass in cane

A recent series of trials in the Cairns district showed that certain weedicides could be usefully employed for the control of guinea grass in cane fields. The main difficulty which was encountered in these trials was not the actual killing of the grass. This could be done readily enough if sufficient weed killer was used. The problem was to keep the cost of doing the job within a practical and economic limit. At the present price of these chemicals there seems little hope of their replacing mechanical cultivation where this latter method is able to be used.

Frequently, however, uneven growth will occur in a cane field and the greater part of the block will be out of hand while the remainder is backward with poor cover. In such weak patches guinea grass rapidly becomes established, and control becomes a matter of hand pulling or chipping, since it is usually not possible to get normal cultivating equipment into the field at this stage of growth. Under these circumstances the timely use of weedicides can be of considerable benefit.

On one such a block at Freshwater very good results were obtained by using intensive mechanical cultivation until the greater portion of the block was out of hand. Where the cane covered in quickly no further trouble occurred with guinea grass, but elsewhere the grass commenced to grow thick and fast after the last cultivation.

Fig. 39—Illustrating the dense growth of Para grass in Innisfail. The operator is spraying with Dalapon as an experiment.

Photo: S. O. Skinner

When the grass seedlings were an inch or two high a weedicide consisting of 2,4-D and p.c.p. plus creosote was applied. This eliminated the weeds, both in the cane row and inter-row, and also provided a pre-emergence effect which retarded further germination.

The period of control obtained was sufficiently long to allow the backward cane to cover it. Actually the spray was applied on 15th January and, when last inspected in the middle of March, the crop was out of hand with no

further guinea grass problem. A few odd stools of guinea grass which survived made very little growth and were of no practical importance. Where no spray had been applied the guinea grass was rapidly smothering the cane to such an extent that it was doubtful whether any crop would be harvested. At the end of each treated plot a wall of grass marked the unsprayed rows.

The particular spray used was 2,4-D (sodium salt) mixed with "Pentasote" weedicide. The latter, which is mainly a contact spray, contains pentachlorphenol, creosote and mineral oil. The rate of application was 4 lb. of 2,4-D plus four gallons of Pentasote in approximately 100 gallons of water per acre. The cost of the material was between £5 and £6 per acre. On country where the growth of guinea grass is less vigorous than on this particular area, it may be possible to get sufficient control with about half the above quantity of contact spray. It is difficult to be sure about this since fields vary considerably, but it would be worthwhile for a grower to investigate this aspect on his own property as an appreciable saving in cost might be effected, without sacrificing a significant amount of control.

There is also no reason to suppose that some of the other types of contact spray on the market would not be equally as suitable as that used in the trial. Mixtures of mineral oil and p.c.p. alone have very good contact herbicidal properties.

Under the conditions of the trial the weedicide was applied by means of a knapsack spray, which of course is a satisfactory method for a small area only. A small inter-row tractor fitted with a power spray would provide an effective answer to the guinea grass problem. Where the size of the difficult area is too small to warrant the expense of this equipment, one of the smaller, hand-guided self-propelled machines might be considered.

Fig. 40—The effect of Dalapon on the surface growth of Para grass. The area on the right was sprayed and that on the left was not.
Photo: S. O. Skinner

Guinea grass on headlands and roadsides

Tall, vigorously growing guinea grass is most difficult to kill unless very costly amounts of weedicide are applied. Some recent trials with the weed killer "Dalapon" have given a limited amount of success. Applications at the rate of

20 lb. and 30 lb. per acre have caused thick stands of the grass to brown off and to appear to be dead. However, in almost every case regrowth occurred and, within a month to six weeks, the grass was again making rapid growth. A further application depressed this regrowth but it did not completely eradicate it. Presumably, repeated applications of Dalapon would eventually get rid of the established stools and would hold any seedling growth in check.

The present price of Dalapon is about 18/- per lb., and 20 or 30 lb. dressings would cost £18 to £27 per acre for each application. Except for very small areas this cost would be prohibitive. At the present time the eradication of guinea grass on headlands, roadsides or adjacent uncultivated land does not seem an economic proposition with the currently available weedicides. Nevertheless, if a worthwhile drop in the price of Dalapon ever occurs, this material could have very definite and useful possibilities.

Para grass

Quite frequently requests are received from farmers for some means of controlling para grass in irrigation and drainage channels. This grass is very vigorous and makes rapid regrowth after cutting, burning, etc. Many of the contact weedicides will kill the surface growth but the grass re-establishes itself quickly and the cost of continually keeping it in check by this method is prohibitive. Perhaps the most effective material yet tried is the weedicide TCA (sodium trichloroacetate). On Mackay Sugar Experiment Station a large drain through a culvert has been a constant source of trouble and expense to maintain free from para grass, and the resulting restriction of water flow. Over the last two or three years, however, a very considerable improvement has been affected by applying TCA at the rate of 100 lb. per acre. This drain is kept practically free by spraying before the wet season commences. If necessary, a second application is made about the middle of the year. In this particular place there is no doubt that the chemical method is much cheaper and more convenient than the control by manual labour previously practised. Apparently the TCA works its way down to the roots and very markedly depresses the regrowth.

"Dalapon" is a relatively new chemical which has been recently tried. This is also showing promise of having a similar effect by killing the surface growth and affecting the root system. When used at the rate of 30 lb. per acre it will, in many cases, cause a suppression of growth for 2-3 months. The effect then appears to wear off and re-spraying is necessary. The cost for this short period of control is rather high (£27 per acre). However, on a small area which is difficult to handle by other means, it has possibilities that might be worthwhile trying.

Guinea grass: *Panicum maximum.*
Para grass: *Brachiaria mutica.*

Queensland Potash Usage in 1957

During 1957 Queensland farmers used 17,451 tons of potash for fertilizing a range of economic crops. This represented 44 per cent. of the total potash used as fertilizer in Australia.

By far the largest user of potash is the Queensland sugar industry, with 12,494 tons, the next largest State figure being 5,786 tons used on pastures in Victoria.

Queensland's total usage of this plant food was divided up as follows:—

	tons
Sugar cane	12,494
Tropical fruits ..	2,429
Market gardens ..	997
Potatoes	496
Other fruits	435
Tobacco	334
Other crops	266

Potash deficiency in our sugar cane soils has been increasing since pre-war years and, despite thousands of advices to growers, there is not much of a trend towards improvement in the position. Today the low potash status of many of our soils must be a limiting factor in cane production.

*Figures supplied by Potash (Australasia) Pty. Ltd.

A Novel Planting Aid

By J. ANDERSON

A labour saving planting aid has been successfully devised and operated by A. and D. Christensen of Beach Road, Ayr. It consists of a cage into which the stalks are stripped and which is lifted when full on to the planter by a front-end loader.

The cage is designed to fit on the floor of a Don cutter planter. It is made of welded one-inch piping with a heavy gauge galvanized iron floor. Two 2½in. x 1in. iron side stays with pick up projections are attached and by this means the full cage is lifted or the empty one lowered. These stays can be set in three different positions to suit differing loads and length of cane.

As the cane is stripped, it is placed into the cage, thus eliminating at least one handling (Fig. 41). In practice it is found that a greater amount of cane can be loaded, with consequent easier feeding, as the stalks are not tangled with each other as is often the case with hand loading. With straight cane of reasonable length, at least 40 chains of drill can be planted with one cage. This represents over 12 cwt. of cane under Burdekin conditions.

When the cage is filled, a light chain is hitched across the load to hold it steady. The front-end loader then lifts the full cage and lowers it on to the planter (Fig. 42). Guide pieces of light iron have been attached to the sides and two front supports guide, as well as stabilize, the cage until the locking pin is placed in position. This is a ¾in. solid steel shaft which is passed through a hole in brackets welded from the planter chassis and through the cage to hold it in position. The planter is then ready for operation. On return after planting, the front-end loader removes the empty cage and picks up the next full

Fig. 41—The attachment is loaded on the ground as the workers strip the stalks.

Photo: J. Anderson

one. By this method, planting is almost continuous, the loading and unloading taking only two to three minutes.

Fig. 42—Lifting the full attachment, with the front-end loader, on to the planter frame.
Photo: J. Anderson

Three cages are necessary for continuous operation of this system and, by using a total of five men, close on one acre per hour can be achieved.

This method has been used by A. and D. Christensen all through this year's planting. Several modifications would assist in ease of handling. The iron sheeting could be extended from six inches to one foot up both sides to prevent cane butts from protruding. The chute cover could be extended back, and a strip to cover the pathway of the locking pin would greatly assist.

As will be seen from the illustrations, the loader being used is a home-made one with the pick-up rakes detached. This loader is wider than the standard makes but, with ingenuity, it should be a simple matter to adapt the standard loaders to this method. A cross bar with droppers probably would be satisfactory, but one point to remember is to keep the point of load as close to the tractor as possible, as a full cage placed on the end of the pick-up of the loader would prove too heavy.

This system provides another use for the front-end loader which, in the planting season, would be idle in the shed.

Mechanical Harvesting

This form of crop handling, the development of which is being intensified in the past year, justifies consideration of several agricultural factors which are bound up with mechanization. One of these is the breeding and growing of varieties which lend themselves more readily to machine harvesting and our cane breeders have not lost sight of the need for erect, compact types with a uniform length of stalk and which remain erect after a pre-harvest burn.

It has also become very evident, when considering the use of the heavier types of mechanical harvesters, that the problem would be less difficult if cane were grown with wider interspaces than is traditional and conventional in Queensland. The limitations of a four feet six inch interspace have been demonstrated with at least one modern harvesting machine. It is many years since Bureau experimentation showed that, with the then grown varieties, there was no appreciable difference in the crops produced whether planted with 4′ 6″, 5′ 0″, 5′ 3″ or 5′ 6″ interspaces. Trials are to be established to ascertain the position with modern cane varieties and the results of this work may form a valuable contribution to the overall harvesting problem.

Another research which is proceeding at the present time is an assessment of the increased deterioration, if any, which results from cutting cane into short lengths during the harvesting operation. One harvester, being tested and demonstrated in the industry, cuts the cane into short pieces; its performance is so promising that the study of deterioration on both cut-up and whole stalks was undertaken to answer that question.

N.J.K.

Does It Pay?

By L. G. VALLANCE

The use of fertilizer is such an essential part of cane farming that it is very seldom a farmer asks himself whether it pays. In 99 cases out of 100 fertilizing very obviously does pay, but whether the most economic return for the cash outlay is being obtained is another question. The use of nitrogen is a case in point.

Practically all our soils require the addition of nitrogen in some form or other. There are a few exceptions, such as very rich river alluvials and creek flats. On these areas the rate of growth is rapid and vigorous and the application of nitrogen merely increases the tendency of the cane to lodge. Here, the use of sulphate of ammonia, urea or any nitrogenous fertilizer does not pay.

However there is no doubt that in most areas nitrogen is necessary for economic crop production. Providing it has the other plant foods also available, cane responds so obviously to nitrogen that no observant grower would neglect its application. The green lush growth, the healthy appearance and the wide leaf are symptoms of a satisfactory environment for producing cane tonnage. However the value of a field of cane does not depend solely on its tonnage.

The difficulty with nitrogen is that it invariably reduces the c.c.s. content of the cane. That it should do so is logical enough since it promotes and accelerates the rate of growth. This occurs at the expense of sugar storage within the stalk. These two factors—growth promotion and sugar storage—are most important from an economic point of view.

The tendency to produce cane in preference to sugar is very clearly illustrated by the results of a trial recently harvested on an irrigated farm (Messrs. J. Searle & Sons) at Airdmillan in the Burdekin district.

This experiment was designed to measure the effect of different amounts of sulphate of ammonia when used a as top dressing. The amounts were:—nil, one, two, three, four and five cwt. per acre. The soil was a dark grey loam capable of growing excellent crops under irrigation. The variety was Trojan, planted about the middle of May, 1956. It was harvested at the end of August, 1957, *i.e.*, when approximately 15 months old. A very good crop of velvet beans was ploughed in before planting.

The soil contained adequate amounts of phosphate and potash. The top dressing was applied on 14th November, 1956.

SUMMARY OF CROP YIELDS

Sulphate of ammonia per acre	Cane, tons per acre	C.c.s.	Return per acre less harvesting and fertilizer costs
Nil	46	18.47	£256
one cwt.	52	18.82	£297
two cwt.	58	18.06	£308
three cwt.	62	17.06	£300
four cwt.	65	16.83	£305
five cwt.	67	16.03	£294

The figures show that by increasing the top dressing from nil to five cwt. per acre the tonnage increased from 46 to 67 tons per acre, *but* the main increase was due to the first two cwt. The subsequent additions, in steps of one cwt., gave much smaller responses. It is notable that the first cwt. of sulphate of ammonia was responsible for an increase of six tons, the second cwt., six tons also; the third cwt., four tons; the fourth cwt., 3 tons; and the fifth cwt., two tons. In other words the response decreased as the amount of fertilizer increased.

The c.c.s. figures show very definitely that, as more sulphate of ammona was applied after the first cwt. application, the sugar content of the cane became less and less. In actual fact it dropped from 18.82 to 16.03. This was a very marked decrease and it appreciably affected the value of the cane.

The gross value of the cane after deducting harvesting costs and the cost of the sulphate of ammonia is given in

the last column of the set of figures. It will be seen that the first cwt. caused the return per acre to rise quickly—from £256 to £297. The second cwt. gave a further worthwhile increase—to £308. Quite evidently the third, fourth and fifth cwt. did not improve the return any further; in fact, there is evidence that the monetary value commenced to fall as the crop became heavier.

It was fortunate that the heavy crop, which was approaching 70 tons per acre, did not go down. This is a very definite risk that is always associated with such large tonnages. If lodging had occurred there would quite possibly have been a more pronounced loss of c.c.s. and much greater harvesting costs.

An interesting feature of this trial is the value of a two cwt. dressing of sulphate of ammonia to plant cane, even though a good green manure crop had been turned in prior to planting.

Random Gleanings

The damaging floods in Mackay and the Lower Burdekin earlier this year have naturally taken their toll of production in sections of those areas. Individual cases of loss are heavy, but the overall position in both districts is such that crop estimates are not greatly affected. The South has staged a remarkable recovery after the calamitous 1957 drought and in Bundaberg, Childers and Maryborough there is every indication of a good crop. Much depends yet on freedom from killing frosts, since the growth is late and the crops very leafy.

A couple of years ago we mentioned in these columns that the South African Sugar industry was having an aerial map produced of the entire Natal sugar belt. The completed farm maps were made available to all growers at a low cost. It was interesting to read recently that one of our Queensland mills—Pleystowe—had decided to photograph some 18,000 acres of its area by using the services of Agricultural Aviation Co. It will be an interesting experiment and might eventually spread to many other mill areas.

Hawaii's Sugar News reports that the world's largest bagasse-fired boiler is undergoing final tests at Paia mill on the island of Maui. It cost $1,240,000, and has a rated capacity of 200,000 pounds of steam per hour at 425 pounds per square inch and 700 degrees Fahrenheit. The new unit will replace several old boilers and make more efficient use of the available bagasse.

Malabar pea, which was selected on our Northern Experiment Station because of its resistance to wilt under very wet conditions, was badly damaged during early 1958 by an infestation of nematodes. This is the first experience of a collapse of a green manure crop from this cause, and it is perhaps too early to predict that Malabar pea will not be a successful legume in that area. Plantings in future years and over a range of farm conditions will demonstrate whether this year's experience was an isolated one or not.

Roguing, as a measure of disease control, is not a new idea and, as long as 1911, Miyake, who was the first to name the fungus causing downy mildew, went looking for the disease in fields of cane in Formosa. "Affected and suspected stools were all dug out" and Miyake reported that they inspected 6,217,212 stools of cane, condemning and destroying 16,967 stools. Who "they" were was not specified but it looks as though a penciller or two must have been included to keep the record straight.

Last January we mentioned that a series of trials had been laid down to investigate a claim that the growth of young ratoons had been accelerated by spraying the stubble with a mercurial solution, such as Aretan. None of these trials, which were conducted in several districts, showed any improvement from the treatment. Growers are accordingly advised not to expend money on such spraying of ratoon stubble.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture of Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.